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ROCKS and MINERALS

Vol. 4. No. 3. SEPTEMBER, 1929 Whole No. 13

Courtesy of Dr. H. C. Dake

PART OF DUMP OF FAMOUS OLD TRADE DOLLAR MINE, SILVER CITY, IDAHO.

SPECIAL ARTICLES

MARBLE. By Dr. Walter F. Hunt.
DEATH VALLEY AND THE BORATES OF CALIFORNIA. By M. Vonsen.
HUGE BERYL CRYSTALS AT ALBANY, MAINE. By E. K. Gedney and Harry Berman.
CAVERNS OF PENNSYLVANIA. By Eugene W. Blank.

THE MAGAZINE FOR COLLECTORS

THE BULLETIN BOARD

OFFICERS NOMINATED FOR 1930

Since our last issue in response to the announcement that nominations for officers of the Rocks and Minerals Association were in order, the following members have been nominated for the offices mentioned after their names:

Dr. Henry C. Dake, Portland, Oregon, renominated for *Honorary President.*

Dr. L. J. Spencer, London, England, nominated for *Honorary Vice-President.*

Mr. Noyes B. Livingston, Fort Worth, Texas, nominated for *Honorary Vice-President.*

Ballots will be mailed to all members of good standing up to June 1st, and the result of the election we hope to be able to announce in our next issue.

TWO NEW FEATURES

We wish to call special attention to the *Membership Department* which begins in this issue and in which will be found a list of new members who joined the Rocks and Minerals Association since January 1, 1929. The list does not include the names of members who have renewed their membership and to whom we feel indebted for their interest in the magazine and the association. We are sure they will join with us in extending a warm welcome to the 350 new members who have come into the association since the beginning of the year.

Attention is also called to the *Honor Roll.* In some states where the membership has not increased as rapidly as in others, there is a chance to secure new members and have your name appear upon the *Honor Roll.* It is natural that in the mineral states there should be a larger membership, but as the purpose of this magazine is to awaken a general interest in minerals and mineral collecting we would more than welcome a large membership from those states not specially noted for their mineral resources. Through exchange and purchase a very excellent collection can soon be gathered together which will be of interest not only to the collector but to all friends and visitors who have an opportunity of viewing it.

In this issue of the magazine we are able to open up the *Mineral Localities Information Department*, mentioned on the Editorial page of our last issue. Dr. Chas. O. Fernquist, Curator of Mineralogy of the Public Museum at Spokane, Wash., is our first volunteer. We hope there may be others in different sections of the United States and those countries, into which ROCKS AND MINERALS now goes, who will be willing to give information regarding mineral localities with which they are familiar in the section of the country in which they reside.

A CORRECTION

In the June issue, the article on the $5,000 Dolomite, page 44, appeared as "The $5,00 Dolomite." It was one of those accidents which sometimes occur in the printing office. In making up the forms for the press, one of the ciphers dropped out. In the galley proof it was correctly printed. When our subscribers reread this article, we trust they will mentally visualize another cipher on the "$5,00."

WANTED: Correspondents in all parts of the world who will be kind enough to send us notes and news items on minerals, etc., that they think may be interesting to the subscribers of "Rocks and Minerals." Such as are available we shall be very glad to print in the magazine.

ROCKS AND MINERALS

The Magazine for Collectors

Published Quarterly

Peter Zodac
Editor and Publisher

The Official Journal of The Rocks and Minerals Association

Vol. 4, No. 3 SEPTEMBER, 1929 Whole No. 13

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ROCKS AND MINERALS (a quarterly) is the only magazine in the country that is devoted to the fascinating study of minerals and their collecting and written in such a way that even the beginner can read and understand it. A subscription makes one a member of the Rocks and Minerals Association.

The *Journal of the Outdoor Life* (a monthly) is the only national magazine written by and for tuberculosis patients. It contains stories, verses and scientific articles written by tuberculosis specialists; conducts a Question Box and has a Nature Study Department in connection with which prizes are offered each month. Offers diversion, help and inspiration not only to tuberculosis patients but to everyone interested in health.

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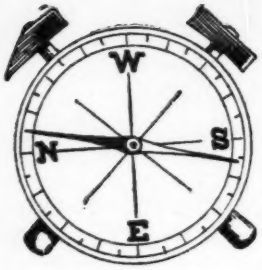

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MARBLE

By Dr. Walter F. Hunt, Editor,
The American Mineralogist
Ann Arbor, Mich.

References in the literature indicate that marble was employed in the early periods of the World's civilization. The exact date, of course, is difficult to state, but it seems certain that the use of marble was well known over 1,000 years before the Christian Era. In Old Testament history it is recorded that King David provided "marble stones in abundance" to beautify the great Temple at Jerusalem. This material was probably obtained from the Island of Paros in the Aegean Sea. This same locality served as one of the main sources of marble for several of the celebrated Greek sculptors.

The use of marble in building and ornamentation was considerably extended by the Romans who introduced numerous colored varieties which they brought from Africa. Many of the palaces of the Caesars were veneered with marble and the progress made in the employment of this material is clearly reflected in the statement made by Emperor Augustus, whose ambition it was to make Rome the most beautiful city in the world, that he found the Capitol made of brick but left it of marble.

Since ancient times many new types of marble have been made available through the discovery of new deposits in France, England, Belgium, Italy and the United States. The demand for marble in recent years has been greatly stimulated by the large increase in the choice of varieties, better shipping facilities and by the employment of more efficient machinery in the quarrying, cutting and polishing operations. No modern office building, hotel, bank or theatre would be considered complete without the finishing touches that only marble can contribute. In the recently constructed office building occupied by the Union Trust Co. of Cleveland, Ohio, it is reported that the equivalent of eight miles of matched marble was used for wainscoting alone.

While the term marble immediately calls to mind certain special characteristics which distinguish this material from all others, it is difficult nevertheless, to give a short, clear-cut definition of marble. This is due to the fact that the term as applied in the trade is more comprehensive in its meaning than when used by the scientist. Strictly speaking, in a geological sense, true marble is a fine grained limestone (or dolomite) that has been subjected to high temperatures or pressures. These geological agencies have brought about changes in the original structure producing a denser rock and one that is *highly crystalline*. By means of a simple experiment Sir James Hall in 1806 was able to prove this theory for the formation of marble. He enclosed a quantity of chalk, which has the same chemical composition as limestone, in a gun barrel and after securely plugging the ends he heated the material to a high temperature in a furnace. After slow cooling it was found that the chalk had been converted into crystalline marble.

Commercially, however, many quite ordinary limestones are included under the general name of marble if they possess attractive colors and can assume a high polish so that they can be employed for decorative purposes. The distinction between the scientific and trade definitions of marble has led at times to considerable confusion and even to legal litigation. A short time ago a foreign shipment of stone arrived at New York. The shippers claimed that the stone was limestone and should bear a duty of only 16c a cubic foot. The federal authorities, however, contended that the stone had sufficient lustre and could be used for ornamental work and, therefore, should be classed as marble and be assessed an import duty of 65c a cubic foot. Court action was finally required to settle the controversy.

As indicated above the outstanding properties of marble that are largely responsible for its popularity are its beauty due to its wide color range and ability to receive a very high polish with comparative ease. The decorative effects that can be secured by the proper selection and arrangement of colored marbles or by carefully matching veined varieties are almost unlimited. In the Hall of

Honor in Montreal's reconstructed City Hall, the choice of marble tiles was such that the floor resembles in every detail a large Turkish rug. Another example of unusual adaptability of marble to interior decoration may be observed in the new Oxford Corner House in London, England. It is generally considered that here the marble work surpasses anything heretofore ever attempted. Around the walls are gigantic landscapes, 20 feet high and hundreds of feet long, composed of large marble slabs weighing in some instances two tons each. One of these landscapes portrays a waterfall with trees, foliage and rocks in their natural colors. Of equal interest is another marble masterpiece which depicts lake and mountain scenery. To carry out these unusual effects in mural decoration required over 550 tons of carefully selected marble which was procured from seven different countries.

Based upon its employment all marbles fall into four large groups—statuary, decorative, building and monumental. Statuary marble is a pure white variety. It should be somewhat translucent and possess a uniform texture. It is the most costly variety and is selected with great care. Decorative marble shows striking color effects which are due to foreign substances which may be evenly distributed or present in bands, veins or streaks. The bluish gray to black colors are due to carbonaceous material; silicates when present generally contribute green tints, while iron and manganese compounds are largely responsible for various shades of yellow, pink or red. Building and monumental marble usually shows uniform colors but not necessarily white. They should possess low absorption and be free from fissures and those minerals which upon exposure would disintegrate or stain the surface.

In some quarters there seems to be an erroneous impression that marble in general is not durable when used in exposed positions in severe climates because of its inferior hardness when compared with other types of building materials. Hardness under these conditions is a minor factor in questions involving durability. The agencies causing rock disintegration are largely physical and result from stresses arising from the unequal expansion of the various minerals present augmented by the freezing action of absorbed water. But the best grades of structural and monumental marbles are single constituent rocks and the absorption is exceedingly low. We might, therefore, expect a long life from marbles possessing these qualities. We are able to obtain some direct evidence on the durability of marble by visiting some of the New England cemeteries and examining the condition of the marble tablets erected in Colonial days. In the old Bennington, Vermont, cemetery there are over 100 tablets erected between the years 1768 and 1800. In most instances the inscriptions are still clearly legible and the only visible signs of disintegration, after 150 years' exposure to the rigorous climate of that region, is a somewhat granulated and roughened surface. This is all the more astonishing when reminded that these slabs were obtained from exposed surface ledges and were not obtained from the more desirable underground beds nor were they subjected to the careful inspection that characterizes modern quarrying operations.

Finally, attention might be directed briefly to certain misuses or abuses of marble. Not enough consideration has been given to the suitability of particular types for specific purposes. Numerous instances could be cited where the popularity of a particular variety has led to its employment in positions and locations where it could not possibly meet the demands made upon it. Many of our most highly prized decorative types, containing numerous wavy seams and bands, should be employed only for interior purposes, for while these markings contribute beauty to the stone they are, nevertheless, lines of weakness and rapid disintegration may follow a few years' exposure to the weather incident to exterior work.

Also one frequently observes in hotel lobbies, theatres and railroad stations floor patterns composed of several types of marble. The general effect is very pleasing but unless these various varieties possess approximately the same hardness, or resistance to abrasion, the surface will soon become quite uneven from the constant wear received in these public places. But by exercising some care in the proper choice of suitable types it is possible to utilize to the fullest extent the best qualities of each variety and thus avoid disappointment and costly repairs that may follow from a haphazard selection.

DEATH VALLEY AND THE BORATES OF CALIFORNIA

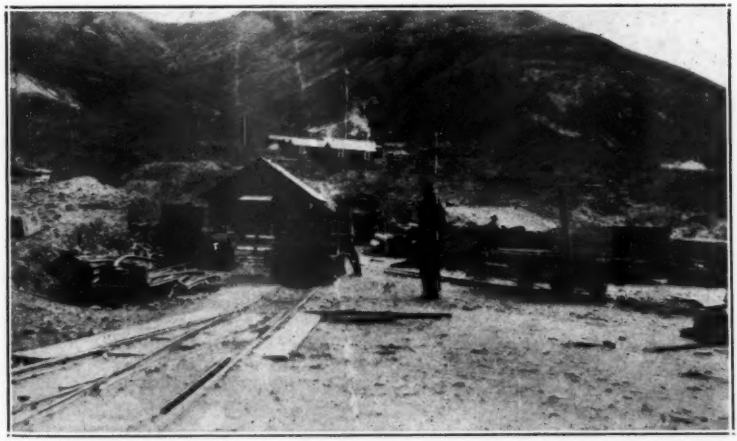
By M. Vonsen
Petaluma, California

California has been and is the main source of the world's supply of borax. A small tonnage is shipped annually from Tibet, Asia, and Chile, South America,the chief borates mined there being tincal (borax) and ulexite.

In the year 1867 borax was first discovered in California in commercial quantities in Little Borax Lake, Lake County. A considerable tonnage of borax was recovered from the mud of this lake. Innumerable perfectly developed crystals, some measuring five to seven inches in length, weighing one pound each, were recovered. Work was carried on for a period of four years, after which mining activities were shifted to the Mojave desert where ulexite was found in large quantities in the dry lake bottoms.

Ulexite was mined for a number of years, principally in Death Valley, where it occurred imbedded in the salt near the surface, also in the form of white, silky, rounded masses on the surface, called cottonballs. Two mills for treating these minerals were built in the valley: the Eagle Borax Works in the southern part of the valley, and the Harmony Borax Mills in the northeastern part of the valley near Furnace Creek Ranch.

In the year 1882 the mineral colemanite was discovered and the deposits of ulexite abandoned. The main colemanite deposits were located in Furnace Creek in the Death Valley region. A quite large deposit was also discovered at Borate in San Bernardino County, and another one at Lang, Los Angeles County. The two latter have been worked out and the mines closed down for several years. Another large deposit near Las Vegas, Nevada, was discovered ten years ago and is still being worked. The largest deposits, however, are in the Furnace Creek district in the Funeral Range



Courtesy of California Division of Mines and Mining.

STATE LEASE MINE, OPERATED BY PACIFIC COAST BORAX COMPANY, SHOSHONE, INYO COUNTY, CALIFORNIA.

Courtesy of California Division of Mines and Mining.

SKETCH MAP OF CALIFORNIA SHOWING THE PRINCIPAL BORAX LOCALITIES.

Mountains and at Monto Blanco.

For one who has ample time to spend in search of minerals, Furnace Creek district should yield many interesting specimens of the borates. Most of the rare borates occur at Monto Blanco on the westerly side of Furnace Creek Wash. In places very fine specimens of crystallized colemanite are found, usually in the short, prismatic crystals, some showing numerous forms, also in drusy masses of small brilliant crystals. In one locality rare crystals were found resembling acute rhombohedral forms with very sharp, pointed terminations.

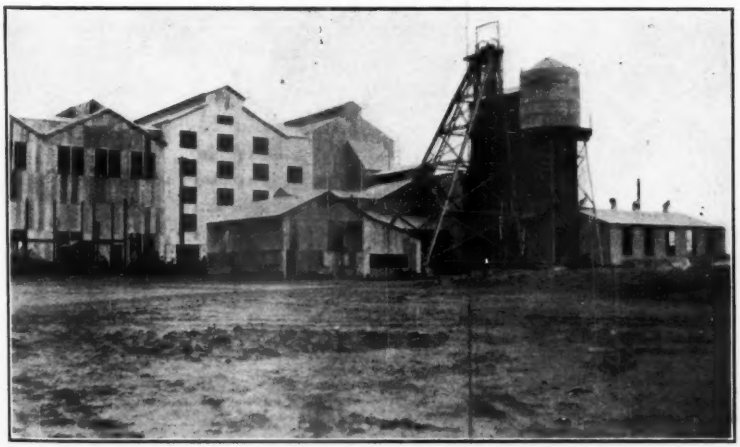
Nearby in a tunnel which had been run years ago, the rare mineral meyerhofferite was found. At first only very ordinary specimens were observed, mostly massive, occasionally some crystals. However on later visits to Death Valley, a more determined search was made, and some beautifully crystallized specimens of this mineral were found in a cavity in the shale. It occurs in clear, glassy, prismatic crystals (monoclinic), often with one good termination. However, it is most commonly found pseudomorphous after inyoite in large, blocky snow-white triclinic crystals.

Priceite, a calcium borate with the same composition as colemanite, occurs in Furnace Creek, and the calcium borosilicate, howlite, is associated with the colemanite in all the deposits.

The rare mineral inyoite is also found at Monto Blanco. It occurs in clear, triclinic crystals. This mineral alters into meyerhofferite. Ulexite also occurs at Monto Blanco, and occasionally very fine specimens of this silky mineral are found showing the asicular crystals with one termination. Hydro-boracite, one of the very rare borate minerals, was found in a rather inaccessible place in the northerly end of Monto Blanco. It is a magnesium calcium borate occurring in nodular forms, which, on breaking open, show columnar crystals radiated from the center.

In one exposure of colemanite on the bank of a dry wash in Furnace Creek, beautiful large crystals of colemanite were found. Half a dozen loose, unattached crystals, which were quite rare, were gathered at this place. Some specimens of colemanite were found, showing crystals up to two inches across the base.

Four years ago the mineral kernite was discovered on the Mojave Desert near Kramer in Kern County ,associated with borax, some colemanite and ulexite. It has since become the source of most of our borax in California, and has resulted in the closing down of the colemanite mines in the Furnace Creek re-



Courtesy of California Division of Mines and Mining.

HEADFRAME AND PLANT, PACIFIC COAST BORAX COMPANY, BORATE, KERN COUNTY, CALIFORNIA.

gion, as this mineral is ideally located for transportation, and the cost of treatment and loss in weight are very small. Kernite is a sodium borate containing only four molecules of water, as against ten in borax. With this mineral is also associated two new minerals, kramerite and mojaveite, both sodium borates.

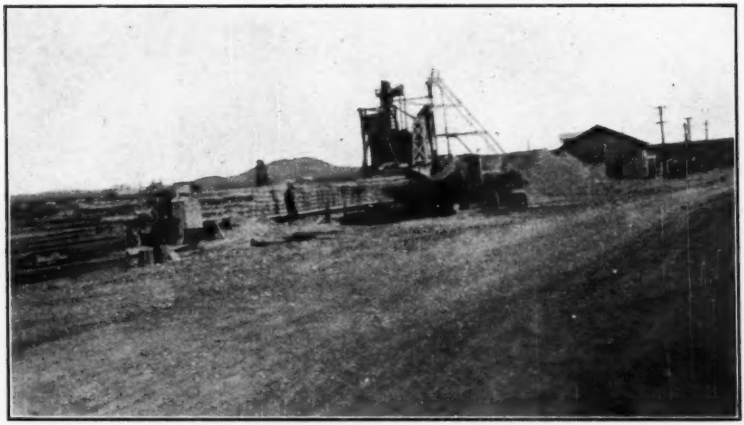
Thousands of tons of borax are also recovered annually from the brine of Searls Lake, as a by-product in the recovery of potash.

The mineral camsellite, a boro-silicate of magnesium, was found by the writer five years ago near Stinson Beach, Marin County, California. It occurs as a very fine, silky mineral in small fissures in serpentine rock; said by Eakle to be derived from the action of borate solutions on the serpentine. The original and only other occurrence of this rare mineral is in British Columbia.

Bakerite, a calcium boro-silicate, was found on the Mojave Desert northeast of Daggett, associated with howlite. This is the only occurrence reported. Vonsenite, an iron magnesium borate, occurs near Riverside, Riverside County, on a contact between granite and limestone. It is apparently derived from the action of borate solutions on magnetite. Ludwigite, a magnesium iron borate, also occurs in the State, although only one minor occurrence has been reported.

Death Valley holds much of interest besides the minerals, which are sought by collectors, and the great deposits of borates. It is located in Inyo County, in eastern California, near the Nevada line. The valley at the lowest point, called the Sink or Bad Water, is about three hundred feet below sea level, and is entirely surrounded by high, precipitous, barren mountains of many colors. The greater part of the floor of the valley is composed of great salt beds, which, through contraction, expansion, and weathering, have assumed most grotesque forms which add to the weirdness of the place. It is said Death Valley is a land of desolation, of sand storms, mirages, mystery and tragedy. This rather terrifying description is perhaps no exaggeration of the valley in the hot summer months. Its history is rich in romance and adventure of the early days when the pioneers undertook to cross it to save distance and time in their rush to reach the gold fields of California on the western slope of the Sierras.

The history of the valley began in 1850, at which time its first tragedy was recorded. In that year a party of immigrants, leaving the main traveled trail, attempted to cross, seeking a shorter route westward. Disaster overtook them in their trek across the deceptive valley, and of their original number of thirty it



Courtesy of California Division of Mines and Mining.

WESTERN BORAX MINE OF WESTERN BORAX COMPANY, BORATE, KERN COUNTY, CALIFORNIA.

is reported that only twelve survived. On leaving the valley after ascending the Panamint Mountains to the west, taking a last look at the valley, one of the survivors said, "Good-bye Valley of Death." Hence the name, Death Valley. Since then others have met a similar fate.

The temperature in Death Valley during the hot days of summer, ranging between 130° and 140°, makes it nearly impossible to live in, as it is claimed there is more or less humidity on the floor of the valley. For this reason many lives have been lost by those undertaking to cross the valley during the hotter months of the year. In fact, almost any time Death Valley is a treacherous place to travel over without an ample supply of water, as the waterholes are far apart and hard to find. During the months from October 1st to April 1st conditions are very favorable for travel, and he who loves the great outdoors will be charmed with this weird land of desolation.

Roads have now been built through the valley and over the mountains, so that it is no longer inaccessible. The beautiful tourist hotel, Furnace Creek Inn, located at the mouth of Furnace Creek Wash in Death Valley, is a delightfful place to stop. It might be compared with any first-class tourist hotel in the United States. Ryan, at an elevation of three thousand feet above the valley, is also delightful to stop at; fine rooms with shower baths, and wonderful meals, may be had at a reasonable price. Furnace Creek Inn and Ryan may both be reached over the Union Pacific Railroad as well as by automobile.

In other words, this once forbidding land is now being opened up to tourists, that they may enjoy the scenic beauty which heretofore has been within the reach of only a few, due to its comparative inaccessibility.

THE OCCURRENCE OF BREUNNERITE AT WEST PATERSON, N. J.

By Charles W. Hoadley,
Englewood, N. J.

On May 11th the writer discovered an interesting brown mineral occurring as vein material in a large boulder at the West Paterson, N. J., "upper quarry" on New Street. This mineral was associated with amethystine quartz and serpentine which latter mineral formed a thin outer coating along the vein. At first this material, which had the appearance of sphalerite, proved to be intimately mixed with small grains of calcite, which were subsequently removed by a hydrochloric acid bath leaving the brown crystalline material free from impurities in the vein. The mineral was tested for iron and magnesia which proved positive; and the optical tests were taken proving definitely that this substance was an iron magnesite.

The thanks of the author are extended to Dr. Colony of Columbia University for the determination of this variety of magnesite which has not been previously reported from the West Paterson quarries.

ACKNOWLEDGMENTS

We wish to acknowledge our indebtedness to the Crystal Cave Company, Inc., of Reading, Penn., for the full page interior view of the rear cavern of Crystal Cave, which is used to illustrate Mr. Blank's article—"Caverns of Pennsylvania;" to Dr. Walter W. Bradley, State Mineralogist of California, for the map and three cuts used with Mr. Vonsen's article—"Death Valley and the Borates of California;" and to Mr. John A. Davis, Chief Engineer, Information Division of the U. S. Bureau of Mines Washington, D. C., for the two pictures we are privileged to print with Mr. Fene's article—"The Mining of Gilsonite in Utah."

These pictures add much to the magazine and to the interest of the articles printed. Will these gentlemen please accept our appreciative thanks?

HUGE BERYL CRYSTALS AT ALBANY, MAINE

By E. K. Gedney and Harry Berman
Cambridge, Mass.

A most remarkable occurrence of beryl has recently been discovered in the Bumpus feldspar quarry on the Cummings' farm in the town of Albany, about six miles south of Bethel. The huge crystals are noteworthy, not only for their size and quality, but also as a concentration of beryllium in such comparatively large quantities.

The beryl occurs in great, six-sided, log-like crystals embedded in the quarry wall, and is the outstanding mineralogical feature of the deposit. It is associated with much potash-feldspar for which the quarry is now being worked. A few plates of white mica are found coating the other minerals, and one or two masses of a beautiful rose quartz six or eight feet across are found associated with the feldspar and beryl.

The enormous size of the beryl crystals are indicated in the accompanying photographs, one of which was submitted by Mr. Stanley Perham of West Pariz, Maine, to whom the mineral rights of the quarry belong. The photographs are of the southwest quarry wall where the crystals were in greater abundance and best visible. Three crystals are well exposed by the mining operations and are each about seventeen feet long and a yard or more in thickness. The largest has a length of about eighteen feet, a diameter of four feet, and an estimated weight of about eighteen tons. Beside these easiiy observed crystals there are exposed portions of seven others which give indications of being fully as large.

One of the more prominent of these has a diameter of four feet and is exposed for a length of fourteen feet, although neither extremity of the crystal has as yet been uncovered. Another of equal thickness has been exposed for a distance of eight or nine feet without reaching either end. Others have been truncated by the mining operations and are only exposed in roughly hexagonal cross-sections which are all from three to four feet in diameter. In addition to the ten large crystals, many smaller

Courtesy of Edward S. C. Smith, Biddeford, Me.

AN EXCELLENT VIEW OF THE LARGE BERYL CRYSTALS EXPOSED IN THE BUMPUS QUARRY.

ones ranging from six inches to a foot or two in thickness are noted in the feldspar and quartz. They are not always in distinct crystals but intergrowths in compact groups with a rather irregular outline in section. One such group lying between a very large crystal of feldspar and a smaller mass of quartz was roughly oval in shape with a long diameter of about eight feet and a width of over a yard.

The larger crystals appear to be in groups radiating outward from a common center very much like the huge spodumene crystals of the Black Hills of South Dakota. This indicates that the crystallization of the beryl began at one or more centers and proceeded outward from these centers in all directions forming star-like groups. The attitude of the crystals in the quarry wall seems to indicate that there are at least two, and perhaps three, of these radial groups partially disclosed.

The crystals of beryl are closely grouped in the area exposed. No two so far observed are inclined at the same angle and they often lie one across the other with much the same appearance and attitude in the quarry wall as the logs in a log-jam in one of our Northwestern rivers. They seem to be more or less localized in their occurrence and all of those so far noted could be enclosed within a circle of a radius of thirty feet or less. The beryl manifests little or no preference in its mineral associates. It is found with either quartz or feldspar, and in places a single crystal may cut directly across both of these minerals. Some of the larger crystals are somewhat cracked and fractured, and plates of mica up to an inch across are formed along these fractures.

In general the beryl is a light apple-green in color, and more or less milky to oqaque. It occasionally varies to an aquamarine variety which, however, is quite commonly badly fractured. Several attractive specimens of aquamarine, and a few broken fragments three or four inches across of golden beryl were noted on the dumps at the quarry. There was estimated to be about eight or nine tons of broken beryl, and a ton or two of very attractive rose quartz on the dumps at and near the mine.

The exposed portions of the crystals were measured with a view of estimating the amount of beryl observed on the

Courtesy of Stanley I. Perham

CLOSE-UP VIEW OF THREE OF THE LARGE CRYSTALS EMBEDDED IN WHITE QUARTZ AND FELDSPAR.

surface in the quarry and on the dumps. About a hundred tons were found exposed to view, and the evident similarity of size between the partly exposed crystals and those large ones more fully revealed, together with their general radial grouping indicating many still uncovered crystals, suggests that at least an equal amount may yet be revealed by future mining operations.

Beryl contains about 67 per cent of silica, 19 per cent of aluminum oxide, and 14 per cent of beryllium oxide. Hence a hundred tons of beryl will contain about fourteen tons of beryllium oxide or approximately five tons of the metallic element beryllium. Inasmuch as the beryllium content of the average granite rock is so small that it does not appear in a chemical analysis, the deposit at Albany represents an enormous concentration of the metal, and is the largest single deposit as yet found in this country.

Other large crystals of beryl have been noted in the United States, particularly at the Ruggles Mine near Grafton, New Hampshire, in the Black Hills of South Dakota, and at Royalston, Massachusetts, but the Albany deposit is probably entitled to rank first as a beryl locality because of the size and number of its crystals.

THE LARGEST BERYL CRYSTAL UNCOVERED WITH A SMALLER ONE EXPOSED AT EACH END. (Photo by E. K. Gedney.)

M. J. Reusz, a graduate of the University of Wuertzburg, Germany, in geology and chemistry, according to an article in the *Democrat-Herald* of Baker, Oregon, appears to have made a remarkable discovery of Nephrite, *in situ*, near Durkee, Ore. Having secured a placer claim which proved to be unprofitable and interested in the geology of the surrounding country, he made a survey and discovered the location of the nephrite. A corporation has been organized to open up and develop the claims.

Nephrite is a form of jade and is used in jewelry and in high-grade artistic ornamental work. It is usually found in water-worn boulders and its comparative rarity has given it a high value in the uses to which it has been applied.

Visitors are welcome, at the mine, which is on the Mormon Basin road, six miles southwest of Durkee; the Oregon Jade Mining Co., Durkee, Ore., are its owners.

CAVERNS OF PENNSYLVANIA

By Eugene W. Blank,
State College, Penn.

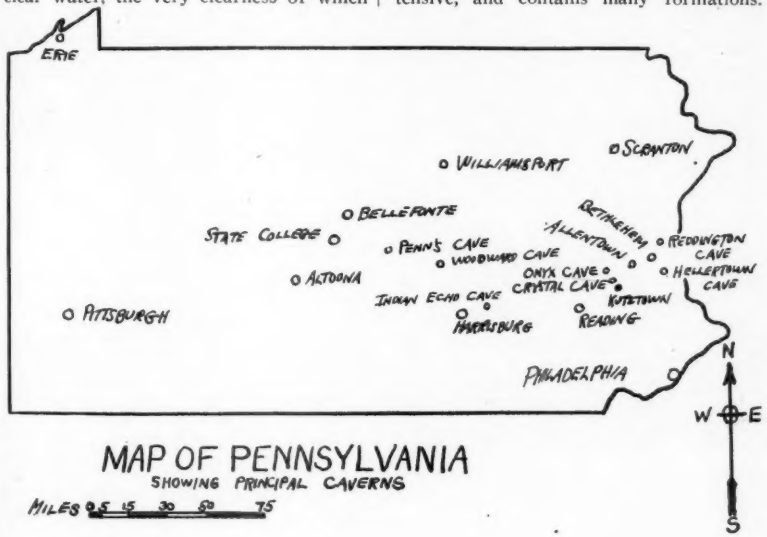
The State of Pennsylvania contains a goodly number of most interesting and varied limestone caverns. It has been the author's privilege and pleasure to visit and explore a number of them during the past several years and this article is the result of accumulated notes and photographs.

There are a number of interesting caves quite close to Allentown, a city of 100,000 population in the eastern portion of the State. Eight or nine miles east is Hellertown, noted for the cavern which bears its name. The Hellertown cave was at one time exploited commercially, but at the present writing is deserted and vandalized. The cautious explorer can still find the remains of the old dance floor where midnight frolics were formerly held.

The entrance to the cave is in a deserted limestone quarry and a long narrow passage-way extends from it several hundred feet into the hills finally culminating in a series of large chambers. The first room contains a pool of crystal-clear water, the very clearness of which usually leads to an inadvertent wetting. A small flight of wooden steps leads upwards to the largest chamber of the cave. In the center of this room is a small pit which leads to the lowest portion of the cave; a small gallery containing a stream of running water. Lehigh University students regularly visit this cave as part of their field work in geology.

Near Reddington, a small hamlet east of Allentown, is another interesting cave known as Reddington Cave. This cave is situated beneath a precipitous limestone bluff and legend has it that the cave was opened by a lucky shot from a cannon. The fact that the property on which the cave is located was used during the World War as a proving grounds by the Bethlehem Steel Corporation gives credence to the tale.

Entrance to the cave is gained by descending a short ladder. Suddenly, one is in an immense vaulted chamber whose ceiling seems ineffably remote by dim torchlight. The cave is dry, quite extensive, and contains many formations.



West of Allentown, along the William Penn Highway, is quiet and unchanging Kutztown. Several miles north, in the very heart of the picturesque hills, is found the famed Crystal Cave.

Crystal Cave was discovered November 12, 1871, while workmen were blasting for limestone on the side of the hill where now stands the entrance to the cave. With lantern and torch these men explored the cave, finding new marvels at every step of the way. Today the interior has been laid out with concrete walks, stairways and railings; electric lights have replaced the smoking torches of the early explorers. The route through the cave is about 2,000 feet in length and at every turn of the path there are greater and more astonishing formations.

PIPE ORGAN, ONYX CAVE, ONE OF THE FANTASTIC FORMATIONS OF THIS CAVE.

The "Seal Rock" is a large crystalline formation which bears a striking resemblance to a huge seal, still dripping water, resting on a large rock. The "Rib Roast," if it were meat, would provide a meal for a leviathan. The "Prairie Dogs" are a series of striking stalagmites. "The Frozen Fountain" is Jack Frost at his very best.

A fine park is at the disposal of visitors. The cave is open every hour of the day and night from March 1st to December 31st, inclusive.

Nearby is another cave known as the Onyx Cave. This cavern has likewise been laid out with paths and electric lights for the convenience of visitors. There are many striking formations and a huge natural bridge of onyx deep in the depths of the cave.

In this locality is also found a small cavern known as "Devil's Grotto." It consists of one large chamber, the floor of which is carved by streams of cold water. The cave has not been opened to the public however and entrance is difficult and muddy.

Making a long jump to the center of the State, we find the historic Penn's Cave, quite close to State College. This cave is probably the peer of all the Pennsylvanian caverns. It excels all other caves in vastness and has the added charm of a water trip. Formations are extensive but mostly stalagmites.

The entire trip through the cave is made by boat. Water rises from a spring right by the entrance to the cave and finds its way through the chambers of the cave disappearing beneath the rocks in the rear chamber to emerge outside as Penn's Creek. Lately the owners of the cave have broken through this rocky barrier and now exploring parties make the trip through the cave to the creek outside before retracing their journey. Most of the chambers are large; the ceiling at one point is 55 feet above the water level. The depth of the water varies greatly; right by the spring the depth is about 40 feet. There are several formations that emit musical notes when struck.

About 1860, a young Quaker, named Isaac Paxton, accompanied by Albert

Courtesy of Crystal Cave Co.

INTERIOR VIEW OF REAR CAVERN, CRYSTAL CAVE OF PENNSYLVANIA, MIDWAY BETWEEN READING AND ALLENTOWN, PENNSYLVANIA.

Wood, traversed the water way in Penn's Cave for the first time. In a dry portion of the cave they unearthed the skeletons of two panthers and made other interesting discoveries.[1]

Some distance southeast of Penn's Cave is the Woodward Cave. This is a dry cavern which extends several hundreds of feet into the hills. There are many and varied formations to provoke the visitor's admiration.

Near Coudersport, along the northern edge of the State, is found the famed Coudersport Ice Mine. This consists of a deep pit in the ground in which there is ice the year round. The higher the temperature outside the shaft the greater the quantity of ice that is formed within. It is a veritable natural paradox.

At the time of writing, a new cave, known as Indian Echo Cave, has been opened to the public at Hummelstown. This town lies on the William Penn Highway between Reading and Harrisburg. The author is without specific information concerning it.

[1]Penn's Grandest Cavern. The History, Legend's and Description of Penn's Cave in Centre County, Pennsylvania. By Henry W. Shoemaker, Altoona Tribune Office, Altoona, Penn.

THE GEM DEPARTMENT

Conducted by
GILBERT HART

Each issue Mr. Hart will give in this department information concerning gems and gem minerals. As Mr. Hart invites correspondence relating to the department, letters should be addressed to him as follows:

Gilbert Hart, P. O. Box 2005, Birmingham, Ala.

Turquoise

Turquoise has been used as a gem since the early Egyptian dynasties, whose miners worked the famous deposits of Sinai in the days when flints were the only tools. It was known to Pliny and his contemporaries, and has found favor with all peoples of modern times. The softness and natural shape make it readily worked by uncivilized nations, so it was highly esteemed by the Aztecs and Incas of America as well as the early Hindus and Chinese of Asia.

"Turquoise" is noted with a variety of spellings in most modern European languages since early in the 16th Century. Popularly it is supposed to be derived from the Turks (Turkish Stone) in allusion to its most famous localities in the Turkish lands of Sinai, Persia, and Turkestan. Other authorities suggest that the old Persian "piruzeh" or "firuzegi" has furnished the base for turquoise. Perhaps "pitdah," a Hebrew name for the second stone of Aaron's Breastplate, is an even earlier form of the word. The Latin names, callais and callaina, referred to varieties of turquoise, and in the early 19th Century gave rise to the scientific "calaite" used for a while by mineralogists for this gem.

The translucency of turquoise is small, so that low cabachons are the best cuts for displaying its color. This color is its great attraction, for it lacks fire, opalescence, or chatoyancy. A large use in the Levant has been in ornamentation of leather, swords, or other valuable articles. Turquoise amulets engraved with quotations from the Koran are favored by Mohammedeans; another example of the wide-spread association of good luck with its use.

Only very recently have turquoise

crystals been found; usually the mineral occurs as a massive amorphous substance, in nodules or veins whose outlines are wholly determined by the surrounding rock. Such surfaces as are naturally exposed are rounded in reniform and mammillary shapes, often suggestive of the stalactites of limestone caverns. Most rough turquoise is of a dull blue-green color with a feeble waxy luster. Precious turquoise is much paler to the favorite sky-blue, and its luster is somewhat higher than inferior varieties. Sometimes off-color stones can be treated to give the desired color, but this is not always successful.

The hardness is about that of steel, so it is difficult to cut turquoise with a knife, though a file will usually mark it. The specific gravity is variable, depending on the content of copper, from 2.62 to 2.86. The darker colored types are heavier, while gem turquoise averages about 2.70 specific gravity. It is rather brittle, breaking with an uneven fracture. This brittleness combined with low hardness makes turquoise a gem of short life unless carefully handled. It is absorbant, and is attacked by acids, hence utmost care must be taken in cleaning soiled stones.

Optically turquoise has not been thoroughly investigated. Its refractive index is 1.62, varying a few points with depth of color. In the refractometer three lines are discernable, proving its biaxial character; but the total dispersion of greatest and least index is small. In the dichroscope slight pleochroism is noted, sufficient to distinguish from opaque glass imitations or from apatite.

Turquoise is one of the few phosphates which find use as gems. It seems to be a basic phosphate of aluminum which contains variable amounts of a copper compound to which is ascribed the color.

Turquoise is known, in gem quality, from every continent except Africa where doubtless the modern explorations of copper miners will locate valuable deposits. The most famous mines are in the Sinai Peninsula where this gem as well as malachite and other copper ores were worked by the ancient Egyptians. Most of the Oriental turquoise came from Nishapur in Persia or Samarkand in Turkestan. These three deposits are similar in the association of the gem with oxidized copper ores in porphyry and clay slate, with the principal companions limonite and malachite. Similar deposits have been described from New Mexico. Other localities are in Siberia, the Central Mountain districts of Europe, Chile, and various places in the Rocky Mountain chain.

Many turquoises of the early 19th Century were bone-turquoise or odontolite. Fossil bones colored by iron salts or copper will afford a mineral very similar to turquoise in appearance and physical properties. Microscopically the bone-cells are visible, revealing the true nature; otherwise odontolite is so close to true turquoise that it is usually described by authors as a natural substitute. *Celestial Stone* is a true turquoise whose name aptly suggests its color. *Edisonite* has been applied to a turquoise whose coloring is irregularly mottled, similar to the sky on a day of only a few faint clouds.

MINERAL LOCALITIES INFORMATION DEPARTMENT

Members desiring information regarding minerals or localities in the following states may obtain same by writing Dr. Fernquist and enclosing a self-addressed stamped envelope.

THE NORTHWEST — Washington, Idaho, Montana, Oregon and parts of British Columbia	Dr. Chas. O. Fernquist, Curator of Mineralogy, Public Museum, 2316 First Avenue, Spokane, Wash.

THE MINING OF GILSONITE IN UTAH [1]

By W. J. Fene
Associate Mining Engineer, Bureau of Mines

History[2]

[1] Printed by permission of the Director, U. S. Bureau of Mines.
[2] Bulletin 4 of the Industrial Commission of Utah.

Gilsonite was discovered in the Ashley Valley in the Uintah Basin, Utah, several years after the first white man settled in the valley in 1878. The settlers discovered veins of a brilliant black substance in various parts of the basin. At first this substance was thought to be a variety of coal. When burned, however, it gave off large quantities of dense black smoke with a peculiar odor and instead of reducing to ashes the material melted and drew out into tarlike threads.

The first discovery was probably made in 1862 at what was then called Culmer vein, several miles south of the present site of the town of Myton in Duchesne County. Soon the Pariette mine was developed and the ore hauled to Price, Utah, the nearest railroad point.

Several years after opening the Culmer mine, a study of the substance was made by Professor W. P. Parker. He discovered that it was a member of the asphalt group and, as it was discovered on the Uintah Indian Reservation, he called it "Uintaite."

Samuel H. Gilson and Bert Seabolt became interested in these deposits and the former spent many years in his efforts to find a market for the Uintaite. His enthusiasm was regarded as more or less wasted by the people of the vicinity and the term "gilsonite" was locally applied to the Uintaite. When Gilson's efforts finally developed a market the name gilsonite had become firmly attached to this substance and it is now so known throughout the world.

Capital was obtained finally and filings were made on the Duchesne vein about 3½ miles east of Fort Duchesne. Lands in this vicinity were then on the Indian Reservation and it was not until 1888 that "The Strip" of 7,000 acres was opened for entry. The St. Louis mine was developed and for many years this was the principal source of gilsonite. The ore was hauled 75 miles to Price, Utah.

Mining was necessarily done rather crudely but enough ore was produced to supply the small demand and work was continued without interruption until 1893 when the explosive nature of gilsonite dust was accidently discovered when some of the dust was ignited by candles. Several miners were injured, one fatally, and so much damage done to the mine that operations were not resumed until the following year. A few months later there was a second explosion, killing two men and setting fire to the ore in the mine. After raging unchecked for 8 days the fire was finally smothered and the mine again operated.

Meanwhile, many larger veins in the eastern part of the basin had been discovered, and in the nineties the demand for gilsonite had increased so much that ore was hauled as far as 125 miles to the railroad

About 1900 the St. Louis Co. was secured by the Barber Asphalt Paving Co. of Philadelphia and reorganized under the name of the Gilson Asphaltum Co. The Indian lands were thrown open and a wild scramble for gilsonite veins ensued. Owing to the expense of developing these properties few individuals were able to finance them and practically all of the land fell into the control of a few companies.

In 1902 the demand for gilsonite was so great that better, quicker, and more dependable methods of placing gilsonite on the market became necessary. The Black Dragon vein was developed and by 1904 enough ore was proved to warrant the construction by the Gilson Asphaltum Co. of a railway connecting the Dragon mine with the Denver and Rio Grande Railroad at Mack, Colo., and named the Uintah Railway.

The Uintah Railway is 55 miles long and is a marvel of engineering with very steep grades and sharp curves. It crosses the Book Cliffs at Baxter Pass, an elevation of 8,437 feet. The trains actually

travel 24 miles between points only 6 miles distant by air line; 3 and 4 per cent grades abound and there are several miles of 5 per cent grade and an unbroken stretch of 7½ per cent grade. The shortest curves are 66°. The road is narrow-gauge and Shay engines haul four cars over the mountain. Recently the largest Mallet engine ever built for narrow-gauge service was secured and it hauls twice the number of cars at a greater speed than that of the Shay engine.

Explosion In Dragon Mine

In spite of every precaution there was an explosion on February 12, 1908. Two men were killed; thousands of dollars worth of damage resulted, the mine became practically a furnace and all of the lower workings were filled with melted gilsonite which solidified. Fourteen months later the bodies of the two victims were recovered and operations resumed. The fire was not completely extinguished and continued to smolder for many months with occasional periods of increased intensity during which the miners wuld become panic stricken and most of them would leave. In November, 1910, flames again broke out but all of the miners were brought to the surface safely.

The fire was extinguished and the mine placed in operation within a few months. Mining under these conditions was so dangerous however that in the spring of 1911 the property was abandoned and after considerable prospecting a site was chosen for a new mine on the Rainbow vein 8 miles to the northwest.

During the summer the Uintah Railway was extended 9 miles along Evacuation Creek and a new terminus built at Watson. A 4-mile branch, climbing 850 feet and requiring a 5 per cent grade most of the way, was run to the new mine at Rainbow.

Courtesy of the U. S. Bureau of Mines

A GILSONITE DEPOSIT IN UTAH.

Properties and Occurrence of Gilsonite

Gilsonite occurs in the veins in a solid homogeneous mass and breaks with a conchoidal fracture. Even in the minutest pieces the brilliant fracture is preserved. Long exposure to the weather causes it to lose this brilliant black luster and it becomes dull and black. Occasionally it has a fine columnar structure at right angles to the walls. This is called "pencilated" ore and is frequently found on both sides of the vein. The veins outcrop on hilltops but elsewhere the ore is covered with 15 feet or more of soil.

The surface ore melts at about 400° and is used principally as a saturant of felt in the manufacture of roof and floor coverings. It is generally designated as White Label ore and with increasing depth it gradually becomes better in grade and is termed "select" grade about 50 feet beneath the surface at the Rainbow mine; but in places north of the White River "select" material is not found until a depth of 300 to 500 feet is reached. Select ore will melt at 275° F. and is used in the manufacture of high-grade paints, varnishes and electric insulation. Although gilsonite lacks any elastic properties, it makes a varnish whose elasticity is remarkable. A thin piece of tin coated with good gilsonite varnish may be bent repeatedly without the coating being cracked.

Gilsonite is closely related to wurtzilite or elaterite and to ozocerite which is also found in the Uintah Basin. A kindred hydrocarbon, grahamite, is found in Oklahoma. Gilsonite is a black tarrylike substance with a brilliant luster. Its specific gravity is 1.035, its hardness is 2, and the streak on a porcelain plate is brown. It is exceedingly brittle and during mining gives off clouds of chocolate-brown dust which softens under the heat of the body and is very penetrating to the skin. It is insoluble in water and is removed from the body with difficulty. It is not affected by acids but is soluble in alcohol, turpentine, carbon bisulphite, heavy oils, and fats.

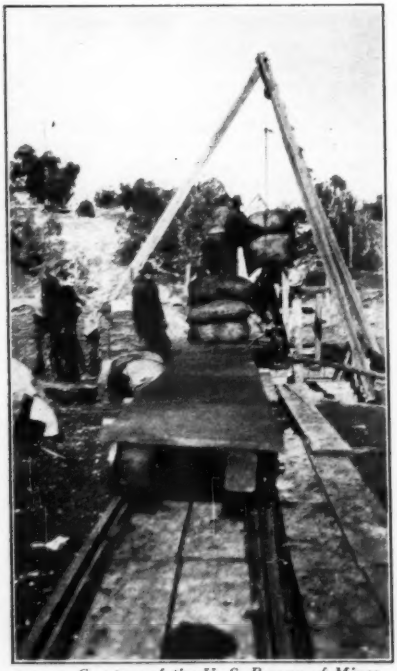
Its average composition and thermal value are:

Composition of Gilsonite

	Per cent
Carbon	88.3
Hydrogen	9.96
Sulphur	1.32
Ash	0.10
	99.68

Thermal Value

Calories	9,650
B.t.u.	17,370



Courtesy of the U. S. Bureau of Mines

LOADING GILSONITE IN SACKS AT A UTAH MINE.

Extent of Deposit

The Uintah Basin is approximately 170 miles from east to west and 100 miles from north to south. It is bounded on the west by the Wasatch Mountains and extends into Colorado about 50 miles in the direction of Meeker. On the north it is bounded by the Uinta Mountains and on the south by the Book Cliffs. This area of some 15,000 square miles contains a storehouse of asphaltum, asphaltic sandstone, and oil shale so large that expressed in figures it is staggering. The basin is a syncline formed by the upbending of the strata against the Uinta Mountains and is cut through the center by the deep gorge of the Green River, which flows towards the south.

By far the greatest amount of gilsonite is found north of the White River where the Lower Uinta measures show less erosion. Three large and nearly parallel veins extend across the country in a N. 60° W. direction with a dip of nearly 90°. The Cowboy vein is the largest and has a maximum width of 18 feet for about 2 miles north of White River. This vein rapidly becomes narrower in both directions but is at least 10 feet wide for 3 or 4 miles and over 6 feet wide for several miles north of White River.

There are numerous veins in the basin and when one considers that 1 mile of the Cowboy vein in the widest place contains about 316,800 tons for each 100 feet in depth, the supply of gilsonite seems almost inexhaustible.

Theory of Origin

Various theories have been advanced as to the formation of these veins. The claim that the source was in some overlying strata is without foundation in view of recent investigations. The most plausible theory appears to be that the formation of this great synclinal basin resulted in gigantic cracks in the brittle and nonelastic sandstone measures of the Uinta

formation with enough heat to distill the oily matter in these carbonaceous measures from the underlying Green River shales.

Uses of Gilsonite

The higher grades of gilsonite are made into varnish, paint, electrical insulation, and inks for rotogravure sections of newspapers. The intermediate grade is used for such articles as telephone mouthpieces, switch handles, and knobs and buttons of various kinds. The poorer grade is used in the saturation of felt.

The ore found near the surface contains foreign matter, mostly silica, which renders it unfit for the best trade. It was formerly the practice to leave in the ground as pillars much of this surface ore, but recently the use of this quality of gilsonite for the saturation of felt has increased until it comprises one-half of the gilsonite ore shipped. The growth of foreign use of gilsonite has increased until one-fifth of the ore mined is consumed outside of the United States. The demand for gilsonite in England, France, Germany, Italy, Holland, Belgium, and Japan is steadily increasing.

A very small amount of foreign matter in a shipment of select ore will render it unsuitable for varnish so that the utmost care must be taken to prevent chips of rock or grains of sand from getting into the high-grade ore.

Operating Companies

At present there are three companies operating in the Watson, Utah, district. The Gilson Asphaltum Co., a subsidiary of the Barber Asphalt Co., operates the Rainbow mine with about 40 men for about 300 days a year. The American Asphalt Association is operating the Country Boy and Rector mines on the Dragon vein with approximately 50 men. Their output is considerably less than that of the Rainbow mine on account of poorer mining conditions and the necessity of trucking ore three to five miles. This company also mines small amounts of ore from holdings on the Cowboy vein. The Utah Gilsonite Co., operating the Little Emma mine on the Uinta vein, employs about 10 men, transporting their ore by truck to Craig, Colo. The combined output of all the companies is about 130 tons daily.

Mining Methods

The method of mining used at Rainbow will be described as it is characteristic of that used at all gilsonite workings.

The mining of gilsonite unlike that of coal or other ores requires no elaborate surface plants for preparation. The gilsonite ore does not have to be prepared and as it is sacked and made ready for shipment in the mine the only loading equipment necessary is a platform from which the sacks of ore are transferred from the mine car to railroad cars.

The ore outcrops at the surface where mining is started and progresses inward and downward, all of the ore of the vein being removed. In working, a system of slopes and benches is used.

At the "Thimble Rock" operation of the Rainbow mine, a small gasoline hoist is employed to hoist the sacked ore to the tramway level. The hoist is so located and the sheave wheels so arranged that ore can be hoisted from any of the different shafts by moving the cable from one wheel to another. At the other operations, gasoline tractor-hoists are employed.

Due to the highly inflammable nature of gilsonite no attempt has been made to use explosives in mining. The ore is very brittle and a sharp pick can be driven into it easily. Trenches about 18 inches wide are dug along each side wall, thus releasing the pressure on the center of the mass so that the ore expands and breaks out of itself or can easily be picked out. The miners who dig the ore also do the sacking and place the sacks, three at a time, on the hoisting cable. The filled sacks weigh about 225 pounds and are sewed with different colored twine to distinguish the various grades. The gilsonite for foreign trade is shipped in double sacks. All mining is done by contract and each man mines about 5 tons, receiving about $1.50 for each ton mined.

The walls are smooth and require little timbering except against the flaking off of small pieces. Occasionally, small veins of gilsonite parallel to the main vein expand after mining and loosen large sections of the wall, requiring much timbering to hold them in place. Horses or large pieces of country rock which may be attached to one or both walls or may be held in place by the ore are sometimes found in the vein. These are usually held in place by a pillar of ore below them, and as gilsonite will readily

expand and fall it is essential that it be supported by timbers and lagging. The timbers used are about 8 inches in diameter and are hitched into the wall on one side and wedged on the other.

As the workings are open to the surface the use of lights is not necessary; the miners become accustomed to the semi-darkness and are able to work without artificial light.

Manways or ladderways are used to enter the different workings. Substantial ladders with landings every 12 feet are guarded by enclosures of heavy wire netting to prevent falling. The mine workings are well protected against falling material from the surface by means of wire netting placed along the tramway level.

The Rainbow mine is the only gilsonite property with direct railroad connections. Also, it has always been the largest producer of gilsonite, about 75 per cent of all gilsonite produced coming from this mine.

FIELD MUSEUM NOTES AND NEWS ITEMS

Contributed by
THE FIELD MUSEUM OF
NATURAL HISTORY
Chicago, Illinois.

Seventeen specimens of agates and concretions found in Illinois and Wisconsin have been presented to the Museum by Ludwig A. von Glaontzke Koelnan of Chicago.

Thousands of by-products are obtained from coal. An exhibit of the principal ones, noteworthy for their diversity of uses and for the many brilliant colors in which they occur, is to be seen in the department of geology at the Museum.

Even the fishes, best fitted of living creatures to escape, suffered catastrophe in the flood of Noah's time, it was revealed by Henry Field, Assistant Curator of Physical Anthropology at the Museum, upon opening boxes of material received from the Field Museum-Oxford University Joint Expedition to Mesopotamia.

Large slabs of clay excavated from the ruins of the ancient city of Kish, and now at the Museum, contain the fossilized bones of hundreds of small fishes which have been identified as various species related to modern carp, gold-fish, and minnows. The clay comes from the strata of the Kish site in which evidences of a great flood, estimated to have occurred about 3400 B. C., and believed to be the one referred to in Genesis, were found recently by the expedition. It is believed that the hundreds of fish were swept inside a room of a building by the swirling flood waters. As the water receded from the building the room became an isolated pool in which they were imprisoned, and still later when the room dried up they died, according to Mr. Field's theory.

Seventy-three specimens of fossil invertebrates, including barnacles, gastropods and pelecypods, have been presented by E. E. Halvorsen of Coalinga, Calif., to the Museum for addition to its paleontological collections.

Examples of various minerals frequently mistaken for gold, with often disastrous results to the interested persons, are shown in an exhibit in the department of geology at the Museum. Contrasted with them are examples of genuine gold from a variety of occurrences.

An exhibit of radiographs made by a number of different species of radioactive minerals, is a feature of the department of geology at the Museum.

A series of eight large crystals, some of them of gem quality, obtained in Madagascar, has been presented to the Museum by William J. Chalmers. Among the crystals is a perfectly formed prism of blue beryl weighing 26 pounds, one of corundum weighing 18 pounds, a 14-pound garnet crystal, and specimens of rose quartz, rose beryl, green beryl, tourmaline and amazonite ranging in weight from one-quarter pound to five pounds. All of these will be added to the Chalmers crystal collection in the Museum, which contains in all several hundred specimens, and is one of the most complete collections of its kind in the world.

Fern and flower-like forms in rocks, deposited by water seeping through cracks, often become objects of great beauty. A collection of these works of nature, known as dendrites, is on exhibition in the department of geology at the Museum.

A beautiful gem of aquamarine, weighing 341½ carats, believed to be the largest perfect gem of its kind in the United States, and one of the largest in the world, has been presented to the Museum by Richard T. Crane, Jr.

The gem has been placed on public exhibition in the H. N. Higinbotham Hall, which contains the Museum's large and valuable collection of gems and jewels of nearly every known variety from all over the world, one of the finest collections in existence.

The Crane aquamarine is a flawless stone, and is of high value. It has been skillfully cut in the form of an oval brilliant, with scores of facets. The dimensions of the stone are length, two and one-half inches; width, one and one-half inches, and depth one inch. Its color and transparency are like those of sea water in its deep blue phase, and it is from this characteristic that this variety of transparent precious beryl derives its name "aqua marine," meaning sea water. Aquamarines occur also in the color of green sea water, but the blue gems of this type are much rarer, and a blue one the size of the present specimen is extremely unusual, according to Dr. O. C. Farrington, Curator of Geology at the Museum, and author of several works on precious stones.

The gem given the Museum by Mr. Crane comes from Brazil, probably from the vicinity of Arassuahy in the State of Minas Geraes, said Dr. Farrington. Beryls of large size are obtained there by mining in the decomposed coarse granites of the region.

It was announced by Stephen C. Sims, Director of the Museum, that the late Mrs. Julius Rosenwald, shortly before her death, made a contribution of $50,000 to further the Museum's work.

No stipulation was made as to the manner in which the fund should be used, that being left entirely within the discretion of the Museum's board of trustees.

During her life Mrs. Rosenwald had long taken an active interest in the work of the Field Museum. A number of years ago, in recognition of her eminent service to science, the trustees of the Museum elected her as an honorary member of the institution.

A comprehensive study of European museum methods is to be made by Stephen C. Sims, Director of the Field Museum, who sailed from New York (July 7th) for England. Mr. Sims will visit all the principal museums of Great Britain and the continent. He is accompanied on the trip by Joseph N. Field, son of Stanley Field, President of the Museum.

The trip is being made in line with the progressive policy established by the Muesum administration to give Chicago an institution which shall always be abreast of the very best and most up-to-date practices in the collection, preparation and exhibition of scientific material.

Additional cooperative arrangements may also be made with European museum authorities which may result in increased relations for the exchange of valuable material between them and the Chicago institution. Director Sims and young Mr. Field will remain in Europe until some time in the fall.

A COMPILATION OF GEM NAMES

By GILBERT HART

P. O. Box 2005, Birmingham, Ala.

Mr. Hart and ROCKS AND MINERALS will be glad to have readers send in additional gem stone names not here included or suggestions as to any corrections in names which they believe should be made.

This is a continuation of the very interesting compilation of gem names (the largest ever printed) made by Mr. Hart, the first installment of which appeared in the December, 1927, issue of the magazine. This list will be continued until completed.—The Editor.

Kashmir Sapphire — corundum, cornflower blue.

Keystoneite — chalcedony colored blue by copper silicate; (2) blue chrysocolla.

Kidney Stone—nephrite.

Killiecrankie Diamond—topaz, limpid, from Tasmania.

King Topaz—corundum, clearflesh-colored, or pink, orange-red, yellow.

Kinradite — quartz, jasper with spherules of quartz.

Kornerupine — orthorhombic, usually fibrous; white; hardness 6.5, specific gravity 3.27; silicate of magnesium and aluminum; also known as **Prismatine.**

Kunzite—spodumene, transparent, lilac.

Kyanite — triclinic, bladed crystals; blue; hardness 5 to 7, according to relation to crystal axes; specific gravity 3.57; silicate of aluminum; gem names: **Blue Talc, Cyanite, Disthene, Rhaetizite, Sappar, Sappare.**

Labrador Feldspar—labradorite.

Labrador Hornblende—hypersthene.

Labradorite — member of the feldspar group of silicates; triclinic, usually massive; white; hardness 6, specific gravity 2.73; mixture of albite and anorthite; gem names: **Bull's Eye, Changeant, Labrador Feldspar, Labrador Spar, Labrador Stone, Oeil de Boeuf, Opaline Feldspar, Ox Eye, Sunstone, Wolf's Eye.**

Labrador Spar—labradorite.

Labrador Stone—labradorite.

Lake George Diamond — quartz, rock crystal from Herkimer, N. Y.

Lake Superior Greenstone—chlorastrolite.

Lapis Colubrinus—serpentine.

Lapis Lazuli—a rock, essentially a mixture of lazurite, hauynite, scapolite, calcite, pyroxene, amphibole, mica, and feldspar; also called **Blue Rock, Persian Lapis.**

Lardite—agalmatolite.

Lard Stone—agalmatolite.

Lasurapatite—apatite, sky-blue.

Lasurite—lazurite.

Latrobite—anorthite, pink.

Iava—a volcanic rock which has been ejected in molten state and cooled to form solid rock.

Lavendine—quartz, amethyst.

Lazulite — monoclinic, massive; blue; hardness 5 to 6, specific gravity 3.122; hydrous phosphate of aluminum with iron and magnesium; gem names: **Blue Opal, Blue Spar, False Lapis Lazuli.**

Lazurfelspar—orthoclase, blue.

Lazurite — isometric, usually massive; blue; hardness 5 to 5.5, specific gravity 2.4; silicate of sodium and aluminum, with sulphide; gem names: **Armenian Stone, Armenite, Azure Stone, Lasurite, Ultramarine.**

Lechosos Opal—milky opal; (2) opal with flashes of deep green; (3) opal with specks of green and carmine.

Leelite — orthoclase, deep flesh-red, waxy luster.

Lenco Sapphire — corundum, sapphire variety, white.

Lennilite—feldspar, greenish, probably microcline, from Lenni Mills, Delaware County, Penn.

Leopardite—porphyry, with black spots due to manganese oxides.

Lepidolite—a mica; monoclinic, usually massive; lilac; hardness 2.5 to 4, specific gravity 2.85; silicate of lithium, potassium and aluminum.

Lepolite—anorthite.

Lignite—brown coal.

Ligurite — titanite, apple green. from the Piedmont of Italy.

Limonite — amorphous, usually botryoidal; various shades of brown and yellow; hardness 5 to 5.5, specific gravity 3.64; hydrous oxide of iron; gem variety, **Rattle Box.**

Lintonite — thomsonite, alternating bands of red and green, in spherical concretions which resemble agate.

Lithia Emerald—spodumene, hiddenite variety.

Lithoxyle—opal, wood silicified by opal, showing woody structure.

Liver Opal—opal, menilite variety, dull grey to opaque.

Lizard Stone — serpentine, from The Lizard, Cornwall.

Lizote — quartz, aventurine, with blue specks of a silver-bearing mineral.

Lode Stone — magnetite which shows polarity.

Love Arrows—quartz, sagenitic.

Luchs Saphire—corundum.

Lucky Stone—staurolite, fairy stone.

Lumachelle—fire marble.

Lydian Stone—quartz, basanite variety.

Lydite—quartz, basanite variety.

Lynx Sapphire—cordierite, water-sapphire; (2) corundum, very dark blue.

Lynx Stone—cordierite.

WITH OUR CONTRIBUTORS

Dr. Walter F. Hunt, Editor of *The American Mineralogist*, a subscriber to ROCKS AND MINERALS and a member of the Rocks and Minerals Association, has most kindly prepared for us the article of Marble which appears in this issue of the magazine.

Dr. Hunt's article is most informative in regard to this familiar "rock," and to many of our readers it will undoubtedly be surprising to learn that marble is susceptible of the artistic effects described by Dr. Hunt.

Most cordial relations exist between *The American Mineralogist* and ROCKS AND MINERALS, and the editor of this magazine is much indebted to Dr. Hunt for his many kind suggestions and words of advice.

We are indebted to Dr. Charles Palache of Harvard University for the very interesting account of the Huge Beryl Crystals at Albany, Maine, which at his request has been prepared for ROCKS AND MINERALS by Messrs. E. K. Gedney and Harry Berman of Cambridge, Mass., who are associated with Dr. Palache in his very interesting work. Our readers, we are sure, will be very much interested in this remarkable occurrence of beryl.

We are also indebted to Dr. Palache for one of the photographs we are using with this article which was taken by Mr. Edward S. C. Smith of Biddeford, Maine.

M. Vonsen of Petaluma, Calif., tells in this issue of some interesting minerals to be found in and around Death Valley, Calif. Most of us have heard of this weird, desolate and forbidding spot and we may not be very anxious to traverse this valley or even to pay it a visit, nevertheless, Mr. Vonsen tells us that at certain seasons of the year the climate is not so disagreeable but that one can stand it without much inconvenience. It is interesting to note that even in this unearthly locality many minerals are to be found that are in keen demand by collectors.

We are very sure that our readers will enjoy this article and will look forward with pleasure to other articles on California minerals with which Mr. Vonsen seems to be so familiar.

LITTLE JOURNEYS

By Albert C. Bates
Newark, N. J.

This is the continuation of an interesting series of articles on dealers and collectors that flourished many years ago.—The Editor.

In Jefferson and St. Lawrence Counties, New York, there are many mineral localities long famous for a wide variety of crystallizations. As is usually the case, some one may be found in the vicinity who is a collector. I learned forty years ago that Mr. C. D. Nims, living at Philadelphia, N. Y., was a dealer-collector, and so I visited him. He had fitted small bins to the walls of a large shed and in these bins was his stock of minerals. The stock was both poor and scanty at the time of my call, due, he said, to having shipped selected material to several dealers. And by the way, there were then many more dealers in minerals than we have now. I asked Mr. Nims if he was soon going to make another collecting trip. He said he guessed not as the work was too hard for the small return he could get for his time and labor.

Some miles further up the railroad was the village of Richville which was famous for its diopsides. These occurred on the farm of Calvin Mitchell and to his home I came and inquired for him. My reception was not all that I had hoped for. "Mr. Mitchell was off in the fields and he had no time to bother with collectors." Evidently the women folks did not much like his taking time to work the little mine "and it never did bring in anything anyway." But I lingered around until Mr. Mitchell arrived home and he came out to the gate to see me. A timid man he was and of the "Uncle Sam" type, as sometimes portrayed. He told me he had no crystals on hand but expected to put a few shots into the mine in the fall. He pointed to an opening in the pasture lot far down a slope and said that was the mine. After a few pleasantries with him I left. But wait—there is a sequel.

Early in the following spring, a man inquired for me at my New York office and on going out to see him, I recognized Mr. Mitchell. My calling him by name pleased him. I arranged for him to take lunch with me. I have seldom met a more haltingly timid man. At noon we met at the appointed place and over the table he showed me a large purse full of crystals. I selected a few of the best, paying his price for them. Leaving the table I took him by the arm as we walked out. He halted and said: "Don't you have to pay for that meal?" I told him it was all paid for. He felt in his pocket and took out a small parcel and handed it to me, saying: "Must have cost quite a lot. You keep that crystal, it was the best one I ever blew out.' We parted, promising to correspond.

At about this time I had begun to turn my attention in collecting wholly to quartz. I was trading all my other minerals for anything unique in quartz that I could bring about and meeting with excellent results.

The New York Museum of Natural History had several large specimens of Ellenville quartz, then as now, not to be found at the locality. I approached Prof. Gratacap about an exchange and he pointed out a large crust of clear crystals (it weighed 36 pounds) and said he could spare that specimen—value $35. I could think of nothing I had to offer of that value. Later the diopside occurred to me. As a crystal it was worth $2. As a cut gem it might be worth a lot. I took it to the lapidary Graham to cut. He sniffed at it: "Worst mineral in the world to cut because of its cleavage." He agreed to do the best he could, the responsibility to be all mine in case of bad luck. He turned out a cushion cut gem of fine deep color of over two carats. Prof. Gratacap readily accepted this in exchange for the Ellenville quartz.

I was a tired collector on reaching home with that 36-pound parcel. At this writing it still reposes in the front of my open cabinet. So much for enthusiasm.

(To be continued.)

THE SLUICE BOX

By A. RIFFLE

This is just an incident that came up the other day. Probably it is neither interesting nor informative, but as I have to fill the space it may perhaps strike a responsive chord in the hearts of some who knew the Old West and the prospecting fraternity.

In the sweeping curve of the State Highway, that forms the main and only street of the village, stands an old building with a colorful past. On its cracked walls is a sign that reads "Ice Cream, Soft Drinks, Candy, etc.," but if you stand in just the right spot, with the light at the right angle, you can see faint traces of an old sign and the lettering reads "Last Chance Bar." I was sitting in this building a few days ago thinking over the changes that a few years have brought. Outside were parked automobiles where a few years ago cow-ponies stood with dropped reins and as a further indication of the age in which we live, back of the counter stood an imported soda dispenser wearing balloon-tired glasses and with his hair slicked back with 600W. "Old Bill" came in carrying in his hand a fist-size specimen of as beautiful a piece of Chalcopyrite as I have ever seen. Pure it was, free from gangue, fine-grained as steel and glistening in the sunlight like a jewel. As "Old Bill" passed the soda fountain on his way back to show me the specimen the soda dispenser asked "What kind of a rock is that?" "Old Bill" made no reply, but seated himself at my side as a gentle tremor rocked the building. No one noticed the trembling except "Old Bill" and I and we knew the cause of it. It was due to the old prospectors up there in the shelter of the Pinnacle turning over in their graves because at last it had come to pass that one of them, with a piece of chalcopyrite in his hand, could walk into this building, the floor of which is scarred with the heel marks of hundreds of old timers of their kind and the old bar dented and scratched from the sharp edges of countless specimens of gold, silver, lead and copper ores that have been passed over in the old days for comment or display and have the man back of the "bar" ask "What kind of a rock is that?"

It will soon be the time again to put away the old battered steel hammer and get out the "Silver Pick" for specimen hunting. There probably never was a time when the collectors were offered better values and service than they are now when you take into consideration the prices of other commodities. Certainly, get all the specimens you can of your own gathering, but don't forget the dealers who are making available to you specimens from distant localities and foreign lands that you could not otherwise easily procure and probably at not less than twice the expense. Patronize the dealers to whatever extent your finances will allow and do not forget to tell them that you saw their ads in ROCKS AND MINERALS.

I just glanced through the June issue again of ROCKS AND MINERALS. With twenty-five years of interest in hobby magazines behind me the only thing I can say of ROCKS AND MINERALS is that it is the best in that line that I have ever seen. To keep it coming, however, there can be no let up in subscriptions, advertisements and contributions. Let's show the Editor that we are with him and give the circulation and advertising one big boost this coming season.

EDITORIAL

This is the third anniversary of the first issue of ROCKS AND MINERALS. When it was first issued some of our friends were not very optimistic in their advice as to the success of the magazine, but our faith that there was need of a publication which would be helpful to the amateur collector and of interest to the scientific mineralogist has been very much strengthened by a constantly increasing subscription list and kind words of appreciation from the scientific mineralogists as well as from those whose interest in minerals has been quickened and stimulated by ROCKS AND MINERALS. Gratifying as these words of sincere commendation have been perhaps even greater have been the efforts on the part of subscribers and members of the Association to increase our membership by securing new subscribers; the extension by members of their subscriptions to the magazine for three and five years and by such very real helpfulness as is expressed in the following letter from Mr. Manchester of New York who permits us to print it.

June 15, 1929.

Dear Sir:

The enclosed cheque is a renewal of my subscription to ROCKS AND MINERALS for another year. The subscription price has been increased purposely in order to express to you my appreciation of the work you are trying to do. To judge from the experiences of others in the past in similar endeavors, you have a difficult road ahead and deserve the support and help of all who are interested in rocks and minerals.

With all good wishes for a successful year, believe me

Sincerely yours,

(Signed) JAMES G. MANCHESTER.

To all of these friends we extend our most heartfelt thanks and appreciation for their helpfulness and encouragement in our efforts to make the collection and study of minerals as interesting and as popular a branch of nature study as that of trees, birds and flowers.

Dr. G. M. Butler, Dean of the College of Mines and Engineering, and Director of the Arizona Bureau of Mines, the University of Arizona, in a letter commending our last issue, for which he has our appreciative thanks, gives us this item regarding a most interesting specimen of the Naica gypsum crystals which the Arizona University Museum is so fortunate as to possess.

"In connection with the description of the group of gypsum crystals from Naica, Mexico, recently added to the Harvard University Museum, which appears on page 54, it will interest your readers to know that we have in our Museum one of these crystals about 3 feet long, which on one side contains a slender cavity parallel to the edge and 8 or 10 inches long which is nearly filled with water. The crystal thus forms a natural level."

Dr. Butler has also called our attention to an error regarding the mineral products of Arizona, appearing in the tabulation on page 47, in which "coal" is given as one of the leading mineral resources of Arizona. This should have read "copper." We regret this error. On looking up the source of our information we find, however, the same error was made there and evidently passed unnoticed.

In the explanatory reference paragraphs following our first article by Eugene W. Blank, in the last issue, Dr. Butler says the metric carat of 0.200 grams is now in universal use in this country. It was, he says, adopted between 15 and 20 years ago and has supplanted the former standard 0.207 grams, which was the weight given in the article mentioned.

A letter from Mr. Blank also asks that the correction as to the carat weight be printed in this issue. His source of information was from a textbook on chemistry which had not noted the change to the metric carat adopted by the United States in 1913. He regrets that this error should have crept into his article.

THE ROCKS AND MINERALS ASSOCIATION

PEEKSKILL, N. Y., U. S. A.

Organized to stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not as yet been discovered; and the endeavor to secure the practical conservation of mineral localities and unusual rock formations.

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If you are not a member of the *Rocks and Minerals Association* you are invited to join.

Subscribing Membership Blank will be found in the back pages of the magazine.

THE PRESIDENT'S PAGE

Exchanging Minerals

By Dr. Henry C. Dake

While much has been said and written relative to the exchange of specimens by collectors, the writer will attempt to add a few more words. The collector with sufficient funds can secure very fine and large collections from the excellent stocks of the dealers; in fact many specimens and species can be obtained only by purchase, or by a personal visit to the localities. To many of us not in a position to make extensive purchases, the exchange plan offers an interesting and relatively a cheaper method of acquiring a good collection.

The exchange method has many possibilities for mutual satisfaction and also a number of disadvantages, all of which are within the control of the parties concerned. It is the opinion of the writer that much of the dissatisfaction connected with exchanging is due to one or both parties being uninformed as to what constitutes good specimen material. It is urged that the beginner in collecting visit some of our museums, institutions and private collections in order to gain a more comprehensive idea of what collectors desire. A good mineral specimen does not necessarily have to be "rare" or "scarce" as it frequently happens that a good or unusual specimen of a common mineral will be of greater mineralogical interest and make a better cabinet specimen than a "rare" one.

Crystallized material is of course of greater value and more showy than massive, but the latter has its value and place in every collection. Most collectors desire specimens not smaller than 2 x 3 inches and not larger than 3 x 4 inches. A limited number of specimens larger than 3 x 4 inches can generally be used in private collections. The writer finds that a few large spectacular specimens arranged in a row on the tops of cabinets adds materially to the collection. Small fragments are worthless for a collection unless they happen to be of very rare species or have an unusual crystal attached. It is therefore obvious that a dozen fragments are not worth the value of one 3 x 4 inch specimen. The moral is, do not waste postage on fragments, nor bother to collect same when in the field. It is desirable that the parties contemplating an exchange first send their duplicate lists with the localities, sizes and descriptions indicated thereon. From the price catalogs issued by mineral dealers a good idea can be obtained as to the approximate value of the specimens. An accurate listing of the locality and the printed references, if any, are a very desirable accompaniment to any mineral specimen, as most collectors find it advantageous to read same when receiving a new specimen.

During vacation time the collector and student of minerals can spend the time to good advantage by a visit to some of the numerous mineral and mining localities. A "find" of an unusual or interesting mineral occurrence will frequently yield sufficient duplicate material for many future exchanges.

MEMBERSHIP DEPARTMENT

New Members Enrolled from Jan. 1—Aug. 1, 1929.

In order that we may become better acquainted with our membership, we shall hereafter print a list of new members as they join the Association. Those who have joined since Jan. 1, 1929, will be found listed below. *The list does not include those old members who have renewed their membership for the year.*

Remember, the more members we have the larger and stronger will be the Association and the better will be the magazine. Interest your friends and have them join so our efforts can be realized. Those who secure five or more members will be listed on our HONOR ROLL. We have a few members on it now, but let us hope that in the next issue the HONOR ROLL will occupy a full column.

THE HONOR ROLL

Members secured since Jan. 1, 1929.

T. S. Bindshedler, Detroit, Mich. 12
Miss D. Rouse, Philadelphia, Pa. 7
N. B. Livingston, Ft. Worth, Tex. 7
The Gem Shop, Wolf Creek, Mont. 5
S. & M. Mineral Supply House, Riverside, Calif. 5

ALABAMA

Harvest—Wilson, Robert.

ALASKA.

Chulitna—Wertz, Harry A.
Ketchikan—Snow, C. R.

ARIZONA

Bisbee—Cass, V. H.
Camp Verde—Conder, Bob.
Cornville—Thompson, E. M.
Douglass—Jones, H. H.
Elgin—Joiner, J. W.
Fredonia—Jensen, A. F.
Hillside—Commode, Julius
Jerome—Blumenauer, A. L.
Stoddard, Marshall.
Joseph City—Mosaic Rock Picture Studio
Katherine—Stone, Clinton.
Kingman—Davis, Geo. B.
Duncan, Chas.
Sufler, Andrew.
Lowell—Rupert, Mrs. Sue.
Nogales—Herbert, Edres
Patagonia—Scheler, C. L.
Pearce—Lemons, C. R.
Phoenix—Diehl, Chas. A.
Smith, Edward.
Ray—Conners, John A.
Roosevelt—Buster, Guy E.
Rowood—Childs, Thomas.
Signal—Boner, N. B.

CALIFORNIA

Alameda—Mitchell, Edward R.
Altadena—Lee, John M.
Arcadia—Renshaw, John A.
Bakersfield—Brown, S. A.
Hurley, G. W.
Nelson, Herb.
Barstow—Chapin, Dr. R. H.
Harman, L. J.
Williams, C. E.
Beverly Hills—Cain, Mrs. Frank.
Gillette, Miss Celeste.
Bishop—Cline, J. W.
Hilton, Leo W.
Moore, Robert W.
O'Brien, Jack.
Bodfish—Zuck, A. O.
Bridgeport—Laughlin, J. M.
Castella—McBride, John F.
Cayton—Thorpe, Jens.
Colton—Mashburn, Ernest.
Small, Howard ("Bud").
Terrill, Arthur Clark.
Death Valley Junction—Westmoreland, N. C.
Dos Palos—Johnson, E. S.
Dutch Flat—Hughs, J. F.
Fellows—Kelly, Frank A. M.
Fertilla—Dupont, J.
Forks of Salmon—Bennett, George.
Snider, C. A.
Fort Bidwell—Powell, J. A.
Fort Jones—Jordan, Frank C.

Gazelle—Chastain, W. J.
Glenco—Truitt, M. W.
Huntington Park—Mowry, Roy M.
Independence—Bedwell, A. W.
Lone—King, Henry.
Jamestown—Lowder, W. H.
Lamanda Park—Hart, Capt. G. J.
Leevining—Mattly, P. W.
Lincoln—Dippel, Philip.
Livermore—Renfrew, A. C.
Long Beach—Clark, Harold J.
Los Angeles—Aumaier, S.
Catlin, W. Prince.
Foster, Mrs. T. M.
Goldbaum, Louis R.
Gyurkovics, Joseph.
Harvey, A. S.
Hokkance, A. O.
Konrad, J.
Kruger, Roy T.
McAntire, Arthur B.
Perrin, C. W.
Smith, O. R.
Young, J. B.
McKittrick—Fairbanks, E. H.
Maricopa—Hudson, Charles L.
Mocalno—Mathieu, Frank.
Mokelumne Hill—Deck, G. C
Selkirk, Jess.
Monterey—Scarlett, Severn.
Montgomery Creek—Thorpe, Jess.
Mount Wilson—Clark, Tom.
Nevada City—Salmon, C. L.
Oakland—Dinneen, E.
Oceanside—Marleau, Louis.
Oil Center—Schoonmaker, W. C.
Onyx—Nieto, R. J.
Pasadena—Cougheman, J. W.
Paxton—Cronin, John P.
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Edmund H. Cienkowski, Science Teacher of Northeast High School of Philadelphia, Pa., has organized a real mineralogical club in the school. The club at present numbers 35 students who are actively interested in the study and collection of minerals. The membership badge is a pin depicting a quartz crystal crossed by prospectors' picks. That it is an active organization might be gathered from the fact that the club had a mineral exhibit at the high school last May which was attended by several hundred people and aroused much interest and favorable comment. Prizes were offered by the Philadelphia Mineralogical Society for the best exhibits.

The club meets weekly when Mr. Cienkowski gives a brief lecture on some mineral or group of minerals. At the end of the year a final examination is held, both theoretical and practical, the latter based upon the identification of minerals covered in the course. Outside speakers as Mineralogists, Mining Engineers, Geologists, etc., are also invited to address the club from time to time.

The success of the club is so marked and the benefits derived from the lectures and addresses so worth-while that ROCKS AND MINERALS would like to suggest to science teachers the formation of similar clubs in their schools.

Mr. Cienkowski and quite a number of the club members are also members of the Rocks and Minerals Association.

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